# UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/814,160 | 03/22/2001 | Dimitris K. Agrafiotis | 1503.0870001 | 2782 |

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| EXAMINER |
|---|
| NGUYEN BA, HOANG VU A |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2122 | |

DATE MAILED: 01/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 09/814,160 | AGRAFIOTIS ET AL. |
| | Examiner | Art Unit | |
| | Hoang-Vu A Nguyen-Ba | 2122 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on <u>24 August 2004</u>.
2a)☒ This action is **FINAL**.      2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) <u>1-14</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-14</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All  b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
          application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

# DETAILED ACTION

1.      This action is responsive to the amendment filed August 24, 2004.

2.      Claims 1-14 remain pending.

## *Response to Amendments*

3.      The objection to the drawings as being informal and incomplete because Figure 2 is missing is hereby withdrawn.

4.      The objection to claims 1, 7, 8 and 14 is withdrawn in view of Applicant's amendments to these claims to correct some minor informalities.

## *Response to Arguments*

5       Applicant's arguments that the rejection of claims 1-14 under 35 U.S.C. § 112, second paragraph as being indefinite is improper are not persuasive. The rejection of these claims is thus maintained. The Examiner does not dispute Applicant's assertion that in light of the disclosure provided throughout the application and the teachings of the prior art, one of ordinary skilled in the art would understand that $n$ and $m$ as used in the claims and throughout the specification represent the number of dimensions where $m < n$. However, one still cannot ascertain how large $n$ can be for infringement purposes. Furthermore, Applicant also asserted that $n$ and $m$ are not specific integers. Could then $n$ and $m$ be real numbers? If yes, then can a method of mapping a set of 100.123-dimensional input patterns to 25.111-dimensional outputs be enabling?

6.      The rejection of claims 2, 4, 5, 7, 9-14 under 35 U.S.C. § 112, second paragraph as being indefinite is withdrawn in view of Applicant's amendments to these claims to correct the lack of antecedent basis of some identified terms.

7.      Applicant's arguments that the rejection of claims 2, 4-5, 7 and 9, 11-12 and 14 under 35 U.S.C. § 101 is improper and should be withdrawn have been fully considered.  However, the Examiner respectfully disagrees with Applicant's assertion that the Examiner has noted that independent claims 1 and 8 are directed towards patentable subject matter.  It is noted that a lack of an explicit rejection of these independent claims is not to be construed as an admission that these claims are directed towards statutory subject matter.  After consideration of Applicant's arguments, the Examiner found that claims 1 and 8 are indeed being directed to non-statutory subject matter.  A rejection of claims 1 and 8 under 35 U.S.C. § 101 is thus presented hereinafter.

8.      <u>Rejection of claims 1-14 under 35 U.S.C. § 102(b)</u>:

Applicant's arguments that Pao fails to teach or suggest the two method steps recited in claims 1 and 8 because these two method steps use a clustering methodology.

In response the Examiner notes that the clustering methodology is not recited in these limitations.  Applicant's arguments are therefore moot.

Applicant further argued that Pao does not teach or suggest:

*determining c n-dimensional reference point*

*partitioning T into c disjoint clusters Cj based on a distance function d*

*training c independent local networks with the respective pattern subsets Cj*

*for an additional n-dimensional input pattern, determining the distance to each*
*reference point in {ci}*

*identifying the reference point $q_i$ closest to the input pattern x*

*mapping $x \rightarrow y$, $y \in R^m$, using the local neural network $Net^L_j$ associated with the*
*reference point $q_i$ identified in step (ii)*

Applicant further cited portions of Pao that describe details of Pao's method of dimensionally reducing non-linear mapped data by a neural network without elaborating on the differences between the two teachings. Applicant's arguments are thus not persuasive. Therefore, the rejection of claims reciting the above limitations under 35 U.S.C. § 102(b) as being anticipated by Pao is considered still proper and maintained and repeated hereinafter for Applicant's convenience.

## Claim Rejections – 35 USC § 101

9.      35 U.S.C. § 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10.      Claims 1-14 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Claims 1 and 14 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Claim 1 recites a method of mapping a set of input patterns to a set of outputs and claim 8 recites a computer program product comprising a computer usable medium having computer readable program code means embodied in said medium for causing an application program to execute on a computer the steps of claim 1.

The Office's interpretation of these claims is that they do not expressly require performance of any of the steps by a machine, such as a general purpose digital computer. Structure will not be read into the claims for the purposes of the statutory subject matter analysis although the steps might be capable of being performed by a machine (as recited in the preamble of claim 14).

The computer program product recited in claim 8 is non-functional descriptive material and is not statutory subject matter.

Statutory subject matter requires two things: 1) it must be in the "useful arts or technological arts;" and 2) it must not fall within one of the exceptions for "laws of nature, physical phenomena and abstract ideas." The Office's interpretation is that claims 1 and 8 are directed to non-statutory subject matter under the "abstract idea" exception.

The fact that a claimed method is not tied to a machine, even if the method could be performed by a machine, and that it does not recite a transformation of physical subject matter to a different state or thing, is an indication that the method is a disembodied "abstract idea" and is not a practical application, as broadly claimed.

Claims 2-7 and 9-14 are not limited to "a practical application of an abstract idea which produced a useful, concrete, and tangible result." State Street Bank & Trust v. Signature Financial Group, Inc., 149 F. 3d 1368, 1375 n. 9 (Fed. Cir. 1998).

Specifically, the claims are directed to an algorithm comprising a series of steps that are based on formula with variables, the range of which not clearly defined. These algorithm and mathematical formula are abstract ideas that do not produce useful, concrete, and tangible results under the State Street Formulation.

On this basis, claims 1-14 are rejected under 35 U.S.C. § 101.


*Claim Rejections – 35 U.S.C. § 102*

11.    The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12.     Claims 1-14 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,734,796 to Pao.

### Claims 1 and 8

Pao discloses at least:

*(a) creating a set of locally defined neural networks trained according to a mapping of a subset of the n-dimensional input patterns into an m-dimensional output space* (see at least Figure 1b and related discussion in the specification); *and*

*(b) mapping additional m-dimensional input patterns using the locally defined neural networks* (see at least Figure 1b and related discussion in the specification).

### Claims 2 and 9

The rejection of base claims 1 and 8, respectively is incorporated.  Pao further discloses:

*(i) selecting k patterns from the subset of n-dimensional input patterns, ( $x$ ,. i = 1. 2. ... k, $x$ R )* (see at least Figure 1b and related discussion in the specification);

*(ii) mapping the patterns {$x_i$} into an m-dimensional space ($x_i$ ->$y_i$, i = 1, 2, ... k, $y_i E R^m$), to form a training set T= {($x_i$, $y_i$), i = 1, 2, .. k}* (see at least Figure 1b and related discussion in the specification):

*(iii) determining c n-dimensional reference points, {$c_i$, i=1,2, ...c, $c_i E R^n$)* (see at least Figure 1b and related discussion in the specification);

*(iv) partitioning T into c disjoint clusters Cj based on a distance function d, (Cj =*
*({(xi, yi): d(xi, cj). <= d(xi, ck) for all k =/j; j = 1. 2. ... c, i=1,2,...k}* (see at least Figure
1b and related discussion in the specification).

*(v) training c independent local networks { Net$_i^L$, i = 1 , 2, ... c }, with respective*
*pattern subsets Ci* (see at least Figure 1b and related discussion in the specification).

## Claims 3 and 10

The rejection of base claims 1 and 8 and intervening claims 2 and 9,
respectively are incorporated. Pao further discloses *wherein said step (iii) is performed using
a clustering methodology* (see at least 1:31-43).

## Claims 4 and 11

The rejection of base claims 1 and 8 and intervening claims 2 and 9,
respectively are incorporated. Pao further discloses:

*(i) for an additional n-dimensional input pattern x E R$^n$, determining the distance to each
reference point in {c$_i$}* see at least Figure 1b and related discussion in the specification);

*(ii) identifying a reference point c$_j$ closest to the input pattern x* (see at least Figure 1b and
related discussion in the specification); and

*(iii) mapping x –>y, y E R$^m$, using the local neural network Net$_j^L$ associated with the
reference point c$_j$ identified in step (ii)* (see at least Figure 1b and related discussion in the
specification).

## Claims 5 and 12

The rejection of base claims 1 and 8 is incorporated. Pao further discloses
*wherein step (a) comprises the steps of:*

*(i) selecting k patterns of the set of n-dimensional input patterns, { x$_i$, i=1,2,*

... $k$, $x_i E R^n$} (see at least Figure 1b and related discussion in the specification);

(ii) *mapping the patterns* $(x_i)$ *into an m-dimensional space* $(x_i -> y_i$, $i = 1$, $2$, ...$k$, $y_I E R^m$, *to form a training set* $T = \{ (x_i, y_i)$, $i = 1 . 2$, ... $k\}$ (see at least Figure 1b and related discussion in the specification);

(iii) *determining c m-dimensional reference points,* $\{c_i, i = 1, 2 ... c, c_i E R^m\}$ (see at least Figure 1b and related discussion in the specification);

(iv) *partitioning T into c disjoint clusters Cj based on a distance function d,* $(C_j = \{(x_i, y_i): d(y_i, c_j) <= d(y_i, c_j)$ *for all* $k =/ j; j = 1, 2 ... c, i=1,2, ...k\}\}$ (see at least Figure 1b and related discussion in the specification);

(v) *training c independent local networks* $\{ Net_i^L, i = 1, 2, ... c\}$, *with the respective pattern subsets* $C_i$ (see at least Figure 1b and related discussion in the specification); *and*

(vi) *training a global network* $Net^G$ *using all the patterns in T*(see at least Figure 1b and related discussion in the specification).

## Claims 6 and 13

The rejection of base claims 1 and 8 and intervening claims 5 and 12 are incorporated. Pao further discloses *wherein said step (iii) is performed using a clustering methodology* (see at least 1:31-43).

## Claims 7 and 14

The rejection of base claims 1 and 8 and intervening claims 5 and 12 are incorporated. Since claims 7 and 14 recite the same limitations of claims 4 and 11, respectively, the same rejections are therefore applied.

## *Conclusion*

13.    Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoang-Vu "Antony" Nguyen-Ba whose telephone number is (571) 272-3701. The Examiner can normally be reached on Tuesday-Friday, 6:45 to 16:45.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Tuan Dam can be reached at (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**ANTONY NGUYEN-BA**
**PRIMARY EXAMINER**

Art Unit 2122
January 8, 2005